

The Use of Raw Foods as Skin Testing Material in Allergic Disorders

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SUMMARY

Frozen foods for skin testing were prepared, stored and used by a simple, practicable, and inexpensive method.

The capacity of raw foods to produce immunologically positive skin reactions by the scratch test method was reaffirmed.

Storage in the frozen state for several months and thawing immediately before using for one series of tests did not affect the allergenic properties of the material.

Raw foods were found to be innocuous to the skin and non-urticariogenic in allergic as well as in non-allergic persons.

Raw foods, by the scratch test method, induced true positive reactions of a larger size and in greater numbers than the corresponding commercial extracts in the same series of subjects tested.

IT has been repeatedly demonstrated that skin tests to determine sensitivity to specific foods in cases in which allergic reaction to foods is clinically obvious are not satisfactory: Often in the presence of food sensitivity, well established by history and clinical trials, reaction to skin test is negative; often positive reactions, the clinical value of which cannot be proved, are elicited.

The reason for this is not entirely understood. One important factor is the variation in the content of the specific antigens present in most of the testing materials. It may be that in the preparation of the extract insufficient amounts of the allergenic portions of the foods are concentrated into it. Or it may be that some of the antigenic fractions are destroyed or are not maintained in an active state. This latter point was clearly demonstrated by Tuft and Blumstein^{2, 3} who showed in 1942 that the standard extracts made from fruits lacked a thermolabile fraction capable in some cases of inducing clinical symptoms and different from another fraction which was thermostable. This thermolabile antigenic fraction was present in the fresh and rapidly frozen material, was greatly reduced by Seitz filtration, was destroyed by heat in canning or cooking,

and disappeared in three to four days at usual refrigeration temperature.

Strauss and Spain¹ stated that "the more completely the antigen in the extract form retains the characteristics which it possesses in the natural state . . . the more precise and the more accurate the cutaneous test will be. Indeed, it would be ideal if it were possible to perform the tests with the antigens in their natural fresh state or original condition."

Impracticable in the past, except in occasional instances, this has become easy to do with the advent and common use of the freezing units. The authors have developed a simple and inexpensive method for the preparation, storage and application of foods as skin-testing materials.

Each food was collected in the fresh state and according to its physical properties reduced to a powder or to a pulp. An electric blender was found most useful for the purpose. The material was divided into shell vials of 2 cc. capacity, closed by clean cork stoppers and immediately stored in a freezing compartment.

Later, small packages were assembled into units containing a complete series of the different foods. A few minutes before the material was to be used for testing, a package was removed from the freezer for thawing. Scratch tests were performed employing one-tenth normal sodium hydroxide or one-fiftieth normal sodium hydroxide with 30 per cent glycerin as a moistening agent. Remnants of the test material were discarded.

Fifty-one foods were chosen as representing generally the important members of the zoological and botanical groups commonly used in the authors' locality. They were:

Beef	Rice	Potato
Chicken	Corn	Tomato
Lamb	Buckwheat	Carrot
Pork	Cinnamon	Celery
Egg	Vanilla	Pineapple
Cow's Milk	Black Pepper	Cantaloupe
Sea Bass	Ginger	Banana
Halibut	Lettuce	Coconut
Salmon	Spinach	Apple
Sole	Cabbage	Almond
Crab	Mustard	Peach
Shrimp	Lima Bean	Strawberry
Clam	Soy Bean	Orange
Oat	Green Pea	English Walnut
Barley	Peanut	Cocoa
Rye	Garlic	Coffee
Wheat	Onion	Tea

Scratch tests were made with the frozen food materials and with one to three different brands of

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Presented before the Section on Allergy at the 79th Annual Session of the California Medical Association, San Diego, April 30-May 3, 1950.

reputable commercial extracts, all at the same time and on homologous sites on the skin. It was confirmed that raw foods have the capacity to produce by the scratch method immunologically positive skin reactions. Moreover, such testing materials proved to be innocuous to the skin and non-urticariogenic in allergic as well as in non-allergic persons. There were slight erythematous reactions to a few foods, such as spinach and tomato, but they did not constitute a difficulty in the interpretation of the reactions.

Storage in the frozen state for several months and a single thawing immediately before use for one series of tests did not affect the allergenic properties of the materials.

Comparative studies were carried out in 66 persons, the majority of whom had allergic diseases of various types. Forty-three of the subjects had en-

tirely negative reactions to scratch tests with both types of materials. Twenty-three had positive reaction to at least one food in tests with one or another of the preparations. In this group it was demonstrated that fresh frozen foods, used as testing material by the scratch method, induced true positive reactions of a larger size and in a greater number of the subjects than did the corresponding commercial extracts (Table 1).

Of the 51 foods used in the tests, 41 elicited positive or doubtful reactions in at least one of the 23 subjects. The total number of reactions to frozen food preparations was 140 (128 positive, 12 doubtful), against 84 reactions (58 positive, 26 doubtful) by the same subjects to standard extracts.

There were only 12 instances in which the reaction to a frozen food was negative when the reac-

TABLE 1.—Results of Comparative Scratch Tests of Frozen Foods and Commercial Extracts in the 23 Patients Who Had Positive Reactions

Foods	Subjects with Positive or Doubtful Reaction	Reaction to Frozen Materials				Reaction to Standard Extracts			
		Positive	Doubtful	Negative*	Points†	Positive	Doubtful	Negative*	Points†
1. Shrimp.....	14	14	....	....	41	3	3	8	4.5
2. Crab.....	10	8	2	....	24	3	2	5	4
3. Pea.....	9	8	1	....	26	3	1	5	6.5
4. Sole.....	7	6	1	....	19.5	2	1	4	5.5
5. Peanut.....	7	6	1	....	19.5	....	2	5	1
6. Sea bass.....	6	6	....	....	18	....	2	4	1
7. Clam.....	6	6	....	....	16	1	2	3	2
8. Rice.....	5	3	1	1	7.5	3	....	2	3
9. Rye.....	5	4	....	1	11	2	3	....	4.5
10. Wheat.....	5	3	1	1	9.5	3	1	1	6.5
11. Cabbage.....	5	5	....	....	10	2	....	3	5
12. Potato.....	5	3	2	....	8	1	2	2	5
13. Tomato.....	5	4	....	1	6	2	....	3	5
14. Banana.....	5	4	1	....	10.5	....	1	4	0.5
15. Halibut.....	4	4	....	....	11	1	1	2	2.5
16. Salmon.....	4	3	1	....	10.5	3	....	1	3
17. Barley.....	4	4	....	....	10	1	1	2	2.5
18. Buckwheat.....	4	4	....	....	10	2	1	1	5.5
19. Corn.....	4	3	....	1	6	2	1	1	5.5
20. English walnut.....	4	4	....	....	15	3	....	1	7
21. Celery.....	3	1	....	2	1	2	1	....	7.5
22. Garlic.....	3	2	....	1	5	1	1	1	1.5
23. Onion.....	3	3	....	....	4	1	....	2	3
24. Oat.....	3	3	....	....	7	3	....	....	7
25. Lima bean.....	3	3	....	....	9	2	....	1	7
26. Mustard.....	2	2	....	....	8	1	....	1	4
27. Spinach.....	2	....	....	2	0	2	....	....	6
28. Almond.....	2	2	....	....	2	2	....	....	6
29. Egg.....	1	1	....	....	4	1	....	....	4
30. Milk.....	1	....	....	1	0	1	....	....	1
31. Chicken.....	1	....	1	....	0.5	....	....	1	0
32. Pork.....	1	1	....	....	1	....	....	1	0
33. Pepper, black.....	1	1	....	....	2	....	....	1	0
34. Coffee.....	1	1	....	....	1	....	....	1	0
35. Cantaloupe.....	1	1	....	....	2	1	....	....	1
36. Coconut.....	1	1	....	....	1	....	....	1	0
37. Orange.....	1	1	....	....	3	....	....	1	0
38. Peach.....	1	1	....	....	1	1	....	....	3
39. Pineapple.....	1	....	....	1	0	1	....	....	1
40. Strawberry.....	1	1	....	....	3	1	....	....	3
41. Soy bean.....	1	1	....	....	1	1	....	....	4
	152	128	12	12	344.5	58	26	68	143

*Under the heading "Negative" are included those instances in which the test was negative to either the frozen food or commercial extract when positive or doubtful with the other.

†"Points" are based on a value of 0.5 for a doubtful positive and 1 to 4 for the positive, the value depending upon the degree of reaction—1+ to 4+.

TABLE 2.—*Comparison of the Degree of Positive Reactions to Frozen and Standard Extracts of Shrimp in 14 Patients*

	Fourteen Subjects													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Frozen	1+	1+	2+	4+	3+	4+	1+	4+	1+	4+	4+	4+	4+	4+
Standard	0	?+	1+	0	0	0	0	1+	0	0	0	0	?+	1+

tion to a standard extract was positive or doubtful; whereas there were 68 instances of the converse.

The predominantly larger size of reactions to the frozen foods as compared to the commercial extracts is represented in Table 1 by the use of a grading system of points in which doubtful reactions receive a value of 0.5 point and positive reactions are valued 1 to 4. On this basis there were 344.5 points for the frozen foods as against 143 for the commercial extracts.

As an example of the difference in potency between frozen and commercial testing materials, a tabulation of the results of skin testing in the 14 patients sensitive to shrimp is presented in Table 2.

ACKNOWLEDGMENT

The authors wish to acknowledge with thanks the technical help of Mrs. Adele S. Davis, B.A., and Miss Frances Eliggi, R. N.

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